

***We Claim:***

1. A microkeratome for use in ophthalmic surgery comprising:  
a bar-link drive;  
a cutting-head connected to the bar-link drive;  
a fixation ring coupled to the bar-link drive; and  
wherein the bar-link drive moves the cutting-head  
at least partially across the fixation ring.
2. The microkeratome of claim 1 further including a controller connected to the drive and fixation ring to control the movement of the cutting-head and the attachment of the ring to the patient's eye.
3. The microkeratome of claim 1, wherein the connection of the cutting-head to the drive includes a snap-on connector requiring less than 360° of rotation of the cutting-head relative to the drive.
4. The microkeratome of claim 1, wherein the bar-link drive includes two (2) drive arms wherein each arm includes a link pin, each link pin including a slot such that one of the link pins mates with an elevation pin and the other pin mates with a flange of the fixation ring.

5. The microkeratome of claim 4, wherein the elevation pin of the fixation ring acts to hold the other link pin above a slot of the fixation ring to improve the ease of assembly of the drive onto the fixation ring.
6. The microkeratome of claim 1, wherein the drive includes a left/right selector that is alternately moveable between a start position of the drive for a patient's left eye and a start position for a patient's right eye.
7. The microkeratome of claim 1 further including a cutting-head locator for angularly positioning an axis of rotation of cutting-head.
8. The microkeratome of claim 7, wherein the cutting-head locator includes indents on opposite sides of the cutting-head for providing location for both left and right eyes of a patient.
9. The microkeratome of claim 7, wherein the cutting-head locator includes resilient spring-like arms.

10. The microkeratome of claim 1, wherein the fixation ring includes structure extending beyond a bottom-most part of an annular ring and raised above the bottom-most part of the annular ring for allowing the microkeratome to be rotated about a patient's eye without interference from the patient's nose, eyebrow, or cheek.
11. The microkeratome of claim 1, wherein the bar-link drive comprises a four bar-link drive.
12. The microkeratome of claim 11, wherein the four-bar link drive comprises a slider-crank mechanism.
13. The microkeratome of claim 12, wherein the slider-crank mechanism includes a pivot hole and a slot formed on the fixation ring.
14. The microkeratome of claim 13, wherein the pivot hole and the slot are generally on opposing sides of the ring.
15. The microkeratome of claim 13, wherein the pivot hole and the slot cause the cutting head to move in an arcuate path across the fixation ring.

16. The microkeratome of claim 13, wherein the pivot hole and the slot cause the cutting head to move in a linear path across the fixation ring.
17. The microkeratome of claim 12, wherein a length of the slot determines the length of translation of the drive mechanism across the fixation ring.
18. The microkeratome of claim 12, wherein the slider-crank mechanism includes at least two slots formed on the fixation ring and a pair of rails for causing the cutting-head assembly to move along a path defined by the rails across the fixation ring.
19. The microkeratome of claim 1 further including a translation stop internal to the drive for allowing adjustable hinge-width.
20. The microkeratome of claim 1 further including a motor for automatically driving the cutting head at least partially across the fixation ring.

21. The microkeratome of claim 1 further including a motor for oscillating a blade assembly within the cutting head.
22. The microkeratome of claim 1 further including a first motor for automatically driving the cutting head assembly and a second motor for oscillating a blade assembly within the cutting head assembly.
23. The microkeratome of claim 4 wherein each arm includes a link pin, such that the link pins mate with structure formed on the fixation ring for guiding the drive mechanism at least partially across the fixation ring.
24. The microkeratome of claim 23 wherein a pivot hole of the fixation ring includes an indentation for mating with a knob of the cutting-head for holding one of the link pins above a slot of the fixation ring.

25. A microkeratome fixation ring comprising:
- an annular ring for contacting a cornea of a patient;
  - structure defining a passage from a bottom surface of the annular ring and within the annular ring for connection to a vacuum source, such that the annular ring may be affixed to the cornea by operation of the vacuum source;
  - structure attached to an upper surface of the annular ring defining a pivot hole; and
  - structure defining a slot attached to the upper surface of the annular ring.
26. A microkeratome fixation ring comprising:
- an annular ring having a bottom surface and an upper surface;
  - an extension attached to the upper surface including a pivot hole;
  - and
  - a slot defined by the upper surface of the annular ring.

27. A microkeratome fixation ring comprising:
- an annular ring for contacting a cornea of a patient;
  - structure defining a passage from a bottom surface of the annular ring and within the annular ring for connection to a vacuum source, such that the annular ring may be affixed to the cornea by operation of the vacuum source;
  - structure attached to an upper surface of the annular ring defining at least first and second slots on opposing sides of the annular ring.
28. A microkeratome for use in ophthalmic surgery comprising:
- a bar-link drive including a motor;
  - a cutting-head connected to the bar-link drive;
  - a cutting blade assembly held within the cutting head;
  - a fixation ring coupled to the bar-link drive; and
- wherein the motor causes the bar-link drive to move the cutting head assembly at least partially across the fixation ring and wherein the motor causes the cutting blade assembly to oscillate as the cutting head assembly translates across the fixation ring so that a flap of corneal tissue is formed on the eye.

29. The microkeratome of claim 28 further including a controller connected to the drive and fixation to control the movement of the cutting-head and the attachment of the ring to the patient's eye.
30. The microkeratome of claim 28, wherein the connection of the cutting-head to the drive includes a snap-on connector requiring less than 360° of rotation of the cutting-head relative to the drive.
31. The microkeratome of claim 28, wherein the drive includes a left/right selector that is alternately moveable between a start position of the drive for a patient's left eye and a start position for a patient's right eye.
32. The microkeratome of claim 28, wherein the bar-link drive is a four bar-link drive.
33. The microkeratome of claim 32, wherein the four-bar link drive is a slider-crank.



34. The microkeratome of claim 33, wherein the slider-crank includes structure forming a pivot hole and a slot on the fixation ring for causing the cutting-head to move in an accurate path across the fixation ring.
35. The microkeratome of claim 33, wherein the slider-crank includes at least two slots formed on the fixation ring and a pair of rails for causing the cutting-head to move along a path defined by the rails across the fixation ring.
36. The microkeratome of claim 28 further including a translation stop internal to the drive for allowing adjustable hinge-width and an electronic translation stop.
37. A microkeratome cutting head comprising:  
a body having an upper side and a lower side;  
a snap-on connector formed on the upper sides;  
a cavity within the body for receiving a cutting-blade assembly such that a portion of the cutting-blade extends beyond the lower side; and  
a pair of knobs for mating with a slot on a suction ring for locating the cutting head on the suction ring.